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BERESKIN & PARR **UNITED STATES PATENT APPLICATION**

Title: **METHOD AND APPARATUS FOR REMOVING FLASH FROM A BRICK**

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Field of the invention

[0001] The invention relates to flash removal, and in particular to a method and apparatus for removing core flash from bricks.

Background of the invention

[0002] The process for mass producing bricks, which are typically made from clay, is well known. The bricks are extruded from clay, cut into the desired shape, and are then fired in a kiln. The extruded bricks (i.e. prior to being fired in a kiln) are referred to as "green bricks".

[0003] Typically, a brick includes a number of holes, which are also known as "cores". These holes are formed in the brick during the extrusion process for any number of reasons, such as reducing the weight of the brick. One type of hole frequently seen in bricks is a cylindrical hole through the entire thickness of the brick. Due to the imperfections of the wire cut process of cutting the green brick, flash is formed in the holes.

[0004] The formation of flash in brick holes is typically not a problem, since typical brick construction simply requires a brick to be laid on other bricks and fastened together by mortar to form structures.

[0005] However, in certain applications, specialized brick structures are required, where the holes of adjacent bricks are aligned, and fasteners are inserted through the holes of adjacent bricks. In these building applications, it is important that no flash be present in the holes, as the flash can block the fastener from entering the hole.

[0006] Accordingly, there is a need for an improved method and apparatus for removing flash from brick holes.

Summary of the invention

[0007] According to a first aspect of the invention, a method of removing flash from a brick which defines a hole therein is provided. The

method comprises: a) moving a rod through the hole; and b) directing a pressurized fluid from the rod into the hole.

[0008] Preferably, pressurized air is sprayed from the distal end of the rod while the rod moves into the hole and is retracted from the hole.

[0009] According to a second aspect of the invention, an apparatus from removing flash from a brick defining a hole therein. The apparatus comprises:

a) a frame;

b) a clamp connected to the frame, wherein the clamp is adapted to releasably secure the brick; and

c) a rod movably connected to the frame, the rod defining an axial channel therein;

[0010] wherein the rod is adapted to move through the hole and deliver a pressurized fluid from the axial channel into the hole.

[0011] Preferably, the rod is a tube configured to spray pressurized air from an open distal end thereof.

[0012] The preferred embodiment of the present invention provides a method and apparatus for automated removal of flash from bricks during their mass production.

Brief description of the drawings

[0013] In the accompanying drawings:

[0014] Figure 1is a perspective view of a preferred embodiment of the apparatus according to the present invention;

[0015] Figure 2 is a perspective view of a portion of the preferred embodiment showing the brick table and rail mounts;

[0016] Figure 3 is a perspective view of a portion of the preferred embodiment showing the main carriage;

[0017] Figure 4 is a perspective view of a portion of the preferred embodiment showing the rear clamp carriage;

[0018] Figure 5 is a perspective view of a portion of the preferred embodiment showing the side clamp assembly;

[0019] Figure 6 is a perspective view of the preferred embodiment in the open position;

[0020] Figure 7 is a perspective view of the preferred embodiment showing the rear clamp carriage in the closed position;

[0021] Figure 8 is a perspective view of the preferred embodiment showing the side clamp assembly in the closed position; and

[0022] Figure 9 is a perspective view of the preferred embodiment showing the main carriage in the closed position.

Detailed description of the preferred embodiment

[0023] Figure 1 shows an apparatus **20** for removing flash from brick holes.

[0024] As best shown in Figure 2, the apparatus **20** includes a generally planar frame **22**. Rail mounts **24** are preferably welded to the frame **22**. A brick table **23** is connected to the frame to support the bricks (not shown).

[0025] Referring again to Figure 1, the rail mounts **24** support two slide rails **26**. Three rail mounts **24** are provided for each slide rail **26**. A rodless cylinder **28** is mounted by any suitable means (such as by bolts) to the frame **22** between the slide rails **26**. The rodless cylinder **28** drives a main carriage **30**. The rodless cylinder **28** is preferably a conventional slotted cylinder, such as RexMover™ Series277 which is commercially available from Rexroth™. A clamp **31** for securing the bricks (not shown) within the apparatus **20** is mounted at the other end of the frame **22**.

[0026] Referring now to Figure 3, the main carriage **30** includes four rods **32** connected to a bracket **34**. Each rod **32** has an axial channel **33**

defined therein. The axial channel **33** terminates at an open distal end **35**. In the preferred embodiment which is best suited for bricks having cylindrical holes, the rods **32** are tubes having a diameter smaller than the diameter of the brick holes. However, the rods **32** may have any suitable shape, depending on the shape of the brick hole. In addition, any suitable number of rods **32** may be provided, depending on the number of holes in each brick and the configuration and number of bricks to be processed (as described in more detail below).

[0027] Continuing to refer to Figure 3, an adjusting clamp **36** is provided for each rod **32** to precisely align each rod with the center of the brick core The rods **32** are connected to a supply of compressed air (not shown) in any conventional fashion. However, it will be understood by those skilled in the art that any other suitable pressurized gas which does not affect the integrity of the clay may be used.

[0028] Continuing to refer to Figures 1 and 3, the bracket **34** is connected to the rodless cylinder **28**. Linear bearings **36** are secured to the bracket **34** and engage the slide rails **26**.

[0029] Referring again to Figure 1, the clamp **31** includes a front clamp plate **40** secured to the frame **22**, a rear clamp carriage **42**, and a side clamp assembly **44**. The front clamp plate **40** includes four waste holes **41**.

[0030] Referring now to Figure 4, the rear clamp carriage **42** includes a rear clamp plate **46** connected to a rear clamp bracket **48**. The rear clamp plate includes four openings **49**. The rear clamp bracket **48** is mounted on the sliding rails **26** (shown in Fig. 1) by linear bearings **50**. An air cylinder **52** is connected to the rear clamp bracket **48** to activate the rear clamp plate **46**.

[0031] Referring to Figure 5, the side clamp assembly **44** includes two side clamp plates **50**. The slide clamp plates **50** are supported on transverse rails **52** (shown in Fig. 1) by linear bearings **54** connected to the slide clamp plates **50**. The transverse rails **52** are connected to the frame **22**. Each side clamp plate **50** is driven by a corresponding air-activated cylinder **56**.

[0032] The operation of the present invention will now be described. Figure 1 shows the apparatus **20** in the open position. The two side clamp plates **50** and the rear clamp plate **46** are retracted. The main carriage **30** is also retracted away from the brick table **23**.

[0033] Referring to Figure 6, a conventional programmable logic control or PLC (not shown) communicates with a robotic delivery system (also not shown) to instruct it to place a brick stack **60** the brick table **23** (best shown in Fig. 2). It will be understood by those skilled in the art that the PLC for a commercially available automated system for mass producing bricks from clay may be modified to operate the apparatus of the present invention. Alternatively, and independent PLC may be constructed in accordance with known techniques. Finally, manual operation of the apparatus, without a PLC, may be used for small batch requirements.

[0034] In the preferred embodiment, the brick stack **60** is configured such that it is two bricks in height and width, and ten bricks in length, with the brick holes being aligned to form a cylindrical channel. It will be understood by those skilled in the art that the brick stack **60** may include any suitable number of bricks in any suitable configuration depending on the configuration of the rods **32** in the apparatus **20**. In addition, the brick stack **60** is composed of green bricks (i.e. extruded bricks which have not been fired in a kiln).

[0035] The robotic delivery system is part of the commercially available automated system for mass producing bricks from clay, and will not be further described. After delivering the brick stack **60**, the delivery system retracts and signals to the PLC that it is clear of the apparatus **20**.

[0036] Referring now to Figure 7, the PLC activates a first solenoid (not shown) which controls the rear clamp carriage **42**, causing the rear clamp carriage **42** to move along the slide rails **26** toward the brick stack **60** until the brick stack **60** is clamped between the front clamp plate **40** and the rear clamp plate **46**.

[0037] Referring to Figure 8, a second solenoid (not shown) is activated to control the side clamp assembly **44**, causing the side clamp plates **50** to slide toward the brick stack **60** along the transverse rails **52** (shown in Fig. 1). The side clamp plates **50** clamp the brick stack **60** in position for flash removal, such that the holes in the brick stack **60** are aligned with the openings **49** in the rear clamp plate **46**.

[0038] Referring to Figure 9, the rodless cylinder **28** is activated by the PLC, driving the main carriage **30** along the slide rails **26** toward the brick stack **60**. As the rods **32** move through the openings **49** in the rear clamp plate **46** and enter the holes in the brick stack **60**, pressurized air is directed into the holes from the distal end **35** of the axial channels **33** (best shown in Fig. 3) in the rods **32**. The rods **32** move through the holes in the brick stack **60** and then retract to their original position. During the entry and the retraction stroke, pressurized air is sprayed into the holes from the rods **32** to break off any flash which may have formed in the brick holes during the extrusion process. Any flash which is not removed by the force of the pressurized air, is punched out of the hole by physical contact with the rods **32**.

[0039] Referring to Figures 1 and 2, the flash removed from the brick stack **60** is blown by the rods **32** through the brick stack **60** and out of the apparatus **20** through the waste holes **41** in the front clamp plate **40**. The flash is blown into a duct (not shown) which channels the flash into a conveyor (not shown) running below the apparatus **20**.

[0040] The pressurized air flow from the rods **32** is turned off when the rodless cylinder **28** driving the main carriage **30** has returned to its starting or "at rest" position, as shown in Figure 8.

[0041] The side and rear clamp carriages **44**, **42** are then retracted to the positions shown in Figures 7 and 6, respectively.

[0042] A reed switch (not shown) on the air cylinder **52** communicates to the PLC that the rear clamp carriage **42** has been retracted to the open

position. The PLC then signals to the robotic delivery system that the brick stack **60** is to be removed. The robotic delivery removes the brick stack 60 and delivers a new brick stack for flash removal. The above process is then repeated.

[0043] While the present invention as herein shown and described in detail is fully capable of attaining the above-described objects of the invention, it is to be understood that it is the presently preferred embodiment of the present invention and thus, is representative of the subject matter which is broadly contemplated by the present invention, that the scope of the present invention fully encompasses other embodiments which may become obvious to those skilled in the art, and that the scope of the present invention is accordingly to be limited by nothing other than the appended claims, in which reference to an element in the singular is not intended to mean "one and only one" unless explicitly so stated, but rather "one or more." All structural and functional equivalents to the elements of the above-described preferred embodiment that are known or later come to be known to those of ordinary skill in the art are expressly incorporated herein by reference and are intended to be encompassed by the present claims. Moreover, it is not necessary for a device or method to address each and every problem sought to be solved by the present invention, for it is to be encompassed by the present claims.